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ABSTRACT

Reviewed are recent studies of the cognitive development of Chinese children. The discussion identifies: (1) systematic studies of children's cognitive development; (2) studies on the development of thinking; (3) studies of memory development; and (4) studies on the influences of various national cultures and education on the development of minority children. Dai, Li, Han, Jinuo, Yi, Bai, Naxi, Mosuo, Zang, Mosolin, and Uygur children were studied. Also explored are general processes and differences in children's cognitive development, and the relation between language and cognitive development. (RH)

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CROSS-CULTURAL STUDIES ON COGNITIVE DEVELOPMENT OF CHINESE CHILDREN FROM DIFFERENT NATIONALITIES

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STUDIES IN RECENT YEARS

In the recent twenty years or so, cross-cultural studies has been considered as a promising orientation in the field of psychological research. In China, cross-cultural studies in developmental psychology started in the late 70's, and most of the work is concentrated in children's cognitive development.

1. Systematic Studies on Children's Cognitive Development

Studies in this field were/are mainly carried out among children from different national minorities in Yunnan Province, China, namely as follows:

- A Study on the Development of Conservation Concept in 6--11 Years Old *Jinuo* Children (Zuo Menglan, 1980),
- The Cross-Cutural Studies on Children Cognitive Development (Zuo, Menglan, 1983),
- A Study on the Development of the Number in Series Concept in 5--11 Years Old Children at Five Districts in China (Zuo Menglan, 1984),
- An Experimental Study on the Development of Classification among Children from Different Nationalities from 3 to 12 Years Old (Wei Chang, 1985),
- A Comparison of *Han* and *Dai* Children of 10--15 in their Cognitive Development (Zuo Mwenglan & Wei Chang, 1985),
- Cultures and Children's Cognition (Zho Menglan, 1985),

etc. These studies were mainly in the aim of exploring the principles in the development of children's cognitive structures from the conceret operation to formal operation by comparing children living in different districts and

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from different nationalities and by analysing cultural factors in children's cognitive development.

2. Studies on the Development of Thinking

The main studies conducted in this field are as follows:

-- A Comparison of the Thinking Characteristics in the Process of Analogical Reasoning between *Zang* and *Han* Primary School Children (Zheng Jiawei, 1980),
-- The Study of Stability of Children's Length Concept of 5-11 Years Old Children from *Zang* and *Hans* Nationalities (Lu Shijie, 1985),
-- Studies on the Comparison of Children's Thinking Development at the Age of 5-15 among Minorities on Qinghai Plateau (Lu Shiwei, 1986),
-- The Study on Concept Acquisition of Bilingual Children (The Group on the Study of Bilingual Children, 1983),
-- The Comparison of the Generalizationability of Ntural Phenomena between Secondary School Students of *Han* and some Minorities in China (Sha Yuying, 1985),

etc. These researchers focused their attentions on various cultural influences on the children's thinking development, and the way different national languages affecting the thinking development.

3. Studies on Memory Development

Research work in this field is mainly conducted by Wang Xiangyie and his colleagues, such as their "Study on the Comparison of Memory of 9-11 Years Old Children from Different Nationalities in Qinghai Plateau" in 1985. They compared and analysed quite a few factors possible for the different memory characteristics of children from six different nationalities in Qinghai, who were habited at different distircts.

4. Studies on the Influences of Various National Cultures and Educations on the Development of Minority Children

Zhang Shifu and his colleagues Studies the learning ability of Children from *Han*, *Bei* and *Dai* nationaties in Yunnan. Another work of "The Relation between *Han* and *Li* Children's Visual Perception and Coordinative Motor Development and their Cognitive Development" was conducted by Zhen Xueyi in Hainan Island and the paper was reported in 1984.

To sum up, two orientations have showed themselves in our recent cross-cultural research work. One is to study general laws in cognitive development. The other is to explore cultural factors of children behaviours in their development and the effects of interventions.

GENERAL PROCESS IN CHILDREN'S COGNITIVE DEVELOPMENT

The above ressearches in recent years have offered some informative results concerning the general process in the cognitive development among children living with different cultural backgrounds.

i. So far as the developmental process is concerned, no significant difference is found in the results of the above experiments. Children reach concret operation stage at 5-15 years old no matter what nationality they are from or where they live. Similar curves can also be seen at the stage of formal operation. (See Fig. 1 & Fig. 2.)

The Piagetian items for the stage of concret operation, such as conservation, seriation, and class-inclusion, appeared successively in the experiments. Compared with data of Geneva, the processes in the development are much like alike except for some slight differences. In Kuming (City, Capital of Yunnan Province), children's weight conservation concept develops earlier than that of Piaget's subjects while length conservation develops later. Class-inclusion is particularly difficult to the children from nationalities habiting in mountain areas or the countryside.

The previous cross-cultural research often failed to provide evidence of formal operational thought among pre-school children in non-western cultures. Recently Zarour and Khuri (1977) found evidence of a shift from concrete

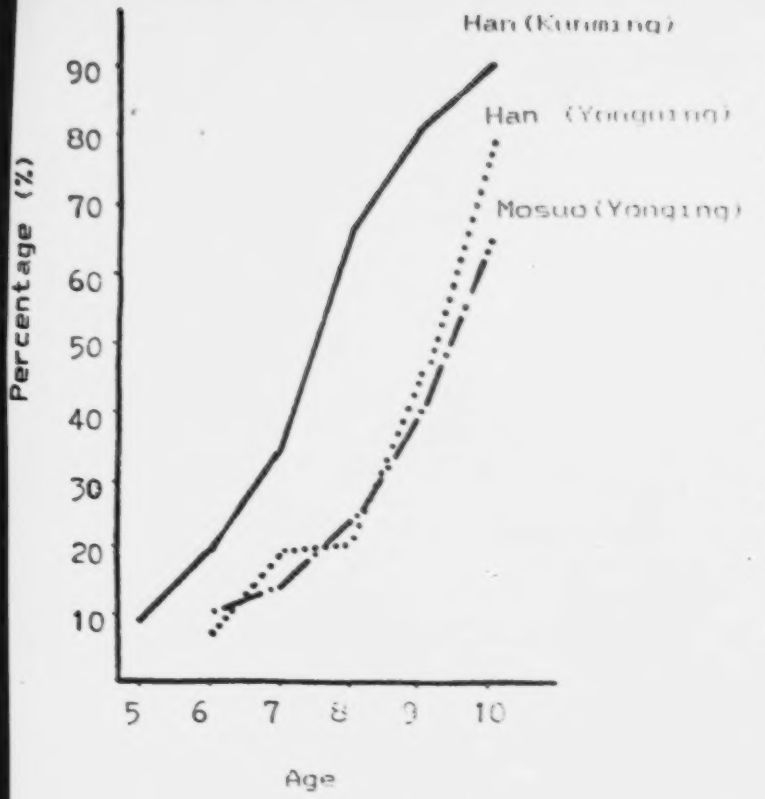

Figure 1 Children Who Passed the Seven Experimental Tests for the Stage of Concrete Operation.

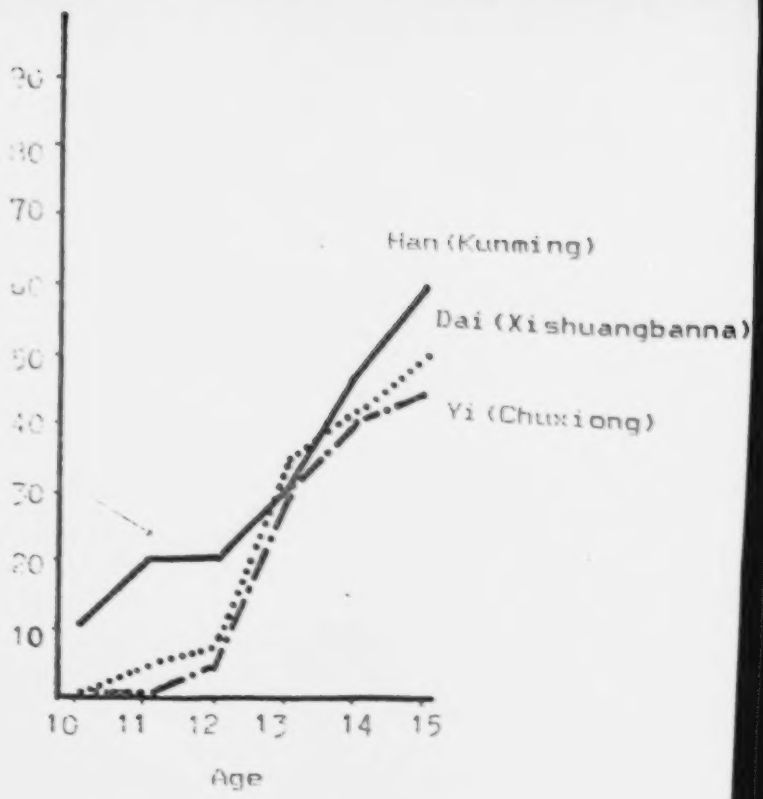

Figure 2 Children Who Passed the Two Experimental Tests for the Stage of Formal Operation.

performance to formal operational performance among 13 year olds in Jordan. Saxe (1976) also reported the discovery of formal operations among Papua children in New Guinea. The experiments conducted in three nationalities in Yunnan indicated that Chinese children reached formal operation stage at 10-15, and with a similar developing tendency (See Fig. 2.).

During each of the two developing stages of concrete operation and formal operation there seemed to be a specially fast developing period, i.e., 'accelarating periods', which could be found almost in any experiment, but at different ages in different places, e.g., for *Han* children in Kumning the "accelarating period" of concrete operation is at the ages of 6-7, but for national minority children in Yongning, it is at 8-10; the accelarating period in the stage of formal operation is at the ages of 13-15 for children in Kunming but for *Yi* children in Chuxion District and the *Dai* children in Xishuangbannan District, the accelarating period could hardly be found among 15 year olds.

2. From the studies on children's concepts of conservation and number series, stability of mathematic concept, and formal operation, which were conducted in children from different nationalities and at different places, the evidences of the developmental processe of children's cognitive structure are as follows:

Children develop through different stages from 'non-conservation' to 'low-level conservation', and finally to 'high-level conservation'. Take the comparison of two lengths for an example, at the primary level children would seek to action reduction, i.e., children think by operation concretly; at the low-level conservation stage they mostly relies on imaginary reasoning, and the typical answer is: "Just now I see they are of the same length." When children reach highe-level conservation they are able to think abstractly. They reason: "The two pieces of iron wire are of the same length. So, no matter how their shapes change, their lengths remain the same." This shows that the essence of the length has been understood. This general process in cognitive development has been shown among children from different nationalities in different places (Lu Shijie, 1985).

The grasp of number series concept expresses itself in the ability to separate each number from a group of numbers, to recognize their orders, to compare the figures, to find out their relations, to abstract and generalize common laws by reasoning and to list each of the following items in order. When someone is solving this kind of problems, the key point is to generalize some laws. Children in Xinjiang, Qinghai and Kunming have shown three developing coginitive stages: (1) 5-6 years old children mainly think by using images and motor operation; (2) 7-8 years old children still think by using mental images, but abstract thinking gradually plays the main role; (3) at the ages of 9-11, dominating thinking in images gradually gives its way to abstract thinking, but images still play an important role in their mental manipulations (Zuo Menglan, Zhou Rong et al. 1984).

3. Results of the systematic experiments indicate that cognition at the stage of concret operation is apperently different from cognitive structure at the formal operation stage, but they are closely related to each other. The fact is that there are stages in children's cognitive development and these stages overlap each other.

The children in Kunming could pass the 'volume' test at the age of 12 (72% passed)) and the other Piagetian tests at the age of 10 (75% passed). (Inhelder set a criterion at the rate of 75%.) Over 75% 12-year-old children at Chuxiong District passed all tests for the stage of concret operation. (The 'volume' tes. was excluded.) The experimental results showed that the children in Kunming reached the low-level formal operation stage at the ages of 10-11, and the children in Chuxiong were at the same stage by 11-12, (for some items the criterion was set at 20%,) (Zuo Menglan & Wei Chang, 1980, 1985). This indicates that two operating structures represent two different cognitive developing stages. According to the experimental results, an overlapping area has been found between these stages. For children in Kunming, this overlapping area in Kunming appears at 10-11, but for children in Chuxiong it seems to be at 11-12. During this period, children's concrete operational thinking is still developing, meanwhile they are progressing into formal operations. We can also see from children's performance that some children are able to work on partial combinations to induce some simple proportion and prelimenary analysis. All the above findings indicate that the development from concret operation to

formal operation is not a shift with the growth of age, but a gradual and progressive process.

4. Training may accelarate the development of conservation concept for children over five. Experimantal results collected in Kunming have revealed that 21% of the 5-year-old children could pass the 'number conservation' test after being trained; and 47% of the 6-year-old children who had been identified to be at pre-conservation level could solve the conservation problems after being trained. But the children of these two age-groups could not solve problems which had never appeared in their training session. Among the 7-year-old children who were at the pre-conservation level, 55% succeeded in solving the conservation problems, and 25% could even deal with problems concerning other items in which they had not been trained. 75% of the 8-year-old children showed transfer effect in doing other tests after they had been trained in number conservation. It shows that training has different effect on children of different age (Wei Chang, 1979).

DIFFERENCE IN CHILDREN'S COGNITIVE DEVELOPMENT

Although there are general laws in the cognitive development of children with different nationalities in different places, differences were found in the development of children with different cultural backgrounds.

1. Differences in Experimental Results

(1) Children living in culturally retarded districts are comparatively slower in their cognitive development than children who live in culturally developed areas. Table 1 shows that *Han* children in Kunming obtained better achievements in the 7 experimental items than children in *Jinuo* district did. The significant age difference lies on different items for different age groups, and the more difficult is the item, (e.g., area and class- inclusion,) the more significant is the difference.

The study on children's memory development of six different nationalities in six different districts also showed

significant culture differences in memory space, memory speed, picture recalling, association recalling, etc. (Wang Xiangye, 1985)

Table I Percentage of Kunming and *Jinuo* children of various ages covering number, weight, liquid, length, area, seriation and class-inclusion.

	6	7	8	9	10
Number					
Han	40	56	76	96	96
Jinuo	0	10	40	50	90
P	–	<.05	–	–	–
Weight					
Han	20	40	80	84	88
Jinuo	0	10	30	40	50
P	–	–	<.05	–	–
Liquid					
Han	16	36	72	84	96
Jinuo	0	0	10	30	60
P	–	–	<.01	–	–
Longth					
Han	12	32	56	60	90
Jinuo	0	0	0	10	30
P	–	–	<.05	<.05	<.05
Area					
Han	4	20	48	72	76
Jinuo	0	0	0	10	10
P	–	–	<.05	<.01	<.01
Seriation					
Han	40	47	72	93	100
Jinuo	0	0	20	30	80
P	–	<.05	<.05	<.01	
Class-Inclusion					
Han	0	7	54	71	87
Jinuo	0	0	0	20	0
P	–	–	<.05	<.05	<.01

(2) The cognitive development of children living in culturally retarded areas seems also to be "retarded". For instance, in *Jinuo* area children reach the level of concrete operation 1-3 years later than children in Kunming do, and then there are still difficulties for them to deal with some of the problems in concrete operation tests. Besides, chidlren under different cultural backgrounds use different strategies in dealing with the same problems. Taking number conservation for an example, *Han* children in Kunming use the method of counting numbers, and they say: "They are all ten, I have counted them;" the *Jinuo* children are used to the one-by-one corresponding method (Zuo Menglan, 1980). Results in the study on the thinking development of Tibetan *Han* and *Zang* children showed that, in the analyzing and synthesizing process of reasoning analogy, most children of lower grades in the *Zang* class took free associations and practical reasons of daily life in their analogical reasoning, which often led to wrong conclusions. But *Zang* children who were in the *Han-Zang* combined class made very few mistakes, and they came successfully to the right conclusions by using audio-visual aids or familiar instances.

Tasks of class-inclusion, area and volume were not very difficult to the children in Kunming, but they were never easy jobs for children living in the countryside and mountain areas. For example, among the 40 children (from 9 to 12 years old) in a village in Chuxiong Mountain area, only 14 could pass the test of class-inclusion, among whom 10 had failed to solve the problems until the experimenter helped them with the actual number of cattles they reared at home; only then could they make out 'the total numbers of pens and the number of pens presented before them'. Similar cases were also met in Yongning and Xishungbanna national minority areas.

2. Main Factors

Differences between cultures can be caused by interactions of various factors, such as environmental factors, cultural tradition and factors concerning education.

For testing and identifying cultural and environmental influences, some experiments were conducted to compare children from different nationalities, but living in the

same district with the same cultural background. These experiments include:

- Studies of Stability of Mathematic Concept among Children from *Bai*, *Naxi* and *Han* Nationalities in Jian Chuan and Lujina, Yunnan (Zuo Menglan, 1982),
- Conservative Experiment of the *Mosuo* and *Han* Children in Yongning (Zuo Menglan, 1982),
- The Study of Cognitive Development of the *Han* and *Yi* Children at the Age of 10-15 in Chuxiong District (Zuo Menglan, 1985),
- The Classification Experiment of *Bai* and *Han* Children in Dali (Wei Chang, 1985),

etc. Results of all of the experimental mentioned above did not show any significant difference btween children from different nationalities and yet learning in the same classe. But in same cases, the difference among some children of the same nationality seemed to be greater than that among children from different nationalities.

In analogical reasoning, students from the *Zang* nationality class in Tibet don't perform as well as *Han* students. But those who are in the *Han-Zang* combined class can do as well as the *Han* Students and their way of thinking is basically alike. (Zhang Jia Wei, 1982) In Qinghai, the memory of students of six different nationalities were compared. Although with the difference of nationalities, the students did not show significant difference in memory in the same area and under the same teaching conditions. (Wang Sianye, 1985)

Most of the experimental results indicate that, under the same cultural background, there is little significant difference in the cognitive development of children from different nationalities. But in some cases, there still exists the priority of *Han* children in their learning achievement. Nevertherless, factors of national origin do not seem to have important effects on children's cognitive development.

Studies were also carried out among children who were from the same nationality, but were brought up in different cultural environments. Comparing *Han* children in Kunming with the *Han* children living in Chuxiong and Yongning mountain areas, we found that, both at the concret

operation stage and formal operation stage, the two groups of children displayed significant difference or even very significant difference between them in some items and at certain age. And the achievement levels of *Han* children living in the mountain areas or countryside are very similar to children from national minorityies in the same school. (See Fig. Ia.) Results of the studies on memory development also showed that significant difference could be found between two groups of children who were from the same nationality (e.g. *Han, Mosolin* and *Zang* in Qinghai) but habit in different places. These results indicate that cultural factors play an important part in children's cognitive development.

3. Cultural Environment

Culture is the combination of many factors with complex interactions among them. The few factors we have been discussing about so far are far from enough to reflect the actual situation. But here is our starting point.

(1) Social Development

Cross-cultural study is the comparison carried out among different cultural environments. How does the unbalanced social development and cultural difference influence the cognitive development of children?

Human society constantly sets higher demands on its members both in substance and social value, pushing forward people's social practice, and asking them to develop cognition to a still higher level. When we were conducting experiments at the beginning of the 1980's, *Jinuo* people still kept their primitive life style and the production by slash-and-burn cultivation. *Mosuo* people in Yongning tried to preserve the ancient matriarchal family style, and they prevented themselves from being interfered by modern civilization. Owing to the low level of production and simple substance and expectations in life, no urgent demand was needed for abstract concept of number and quantity in their practical life. The concepts of conservation, classification, mathematics etc, selected in the experiments all came from developed civilization with advanced science and technology. So they were new to *Jinuo* and *Mosuo* children. It is very difficult to stuff modern knowledge and abstract concepts into these children. But

the visual-motor perceptual coordination, being the most elementary function in practical life, is universal in practical activity. Therefore, there was no difference in those tests for children from different nationalities and living either in coastal areas where technology and science are better developed or in the culturally retarded mountain areas.

(2) School Education

School education plays a very in children's psychological development. Different cultural and educational levels have different influnces to the children's cognitive development. In some backward mountain areas, primary school education has not been popularized and there is no pre-school educational institution. The age for school entrance is also later, and the teaching level is rather low. All of these factors influence the children's cognitive development to a certain degree. For instance, when the average of the 6-8 years old children in Kunming are at the accelarating period in conservation development, many *Jinuo* children of the same age have not entered school, and they don't know counting. They have never used measuring tools or rulers, steelyards or shengs, and have no chance to get in touch with abstract symbols or characters and numbers. But at the formal operation stage, this difference is reduced because experiments of formal operations were done in the middle schools of cities and towns, children from the mountain areas live in schools, their study environment and living conditions are similar to that of the children from cities and towns. Therefore, when you compare the achievement level among the *Han*, *Dai* and *Yi* children in Xishuangbanna, Chuxiong and kunming, children's achievements in Kunming are slightly higher. But this difference is reduced with the increase of age.

RELATION BETWEEN LANGUAGES AND COGNITIVE DEVELOPMENT

On the relation between language and cognitive development there has been a controversy in psychological areas for decades. Anyway, language and thinking are too close to be seperated: language is also the external activity of thinking. But language and thinking cannot be the same thing.

There have not been many special cross-cultural studies on the relation between language and cognitive development in China, but the study of cognition involves the relation of these two aspects. Most verbal tests were given in the studies oo memory and thinking. The achievement of children who spoke a minority language as their mother tongue could not perform as well as those whose mother tongue is Chinese (Zhang Jiawei, 1980; Wang Xiangye, 1985; Sha Yuying, 1985). In some studies, both languages and operations were used. Children's operation was observed and children were asked to explain their own operations. The conclusions from these experiments indicate that, under the same cultural environment, no significant difference was found in the achievement of the children who spoke more than one languages (Zuo Menglan & Wei Chang, 1982, 1983, 1985). As to children's achievements in normal times and the achievements in the unified examinations, *Han* children made much better achievement than minority children who spoke minority nationalitiey language than those of the *Han* children, but the latter's mathematical achievement did not lag behind. The bilingual teaching experiment showed that, when the bilingual *Uygur* children in Xinjiang and bilingual children in Shanghai failed in the conservation test and were than trained by using one of the languages they spoke, they would show the transference effects when being tested again in another language. This illustrated that the independent variable quality of thinking is not wholly restricted by languages. But if children are trained in their mother tongue, their achievement would be better, which shows that language plays a certain role in obtaining concepts (The Research Group of the Bilingual Children's Concept Formation, 1983).

SUMMARY

Cross-cultural psychological researches have collected quite a few valuable date in exploring general laws of universality and particularity in psychology. Studies in this field have been widely carried out all over the world. China has the largest population in the world, and has more than 50 nationalities speaking different languages and with different cultural traditions and environments. We shall make better use of these good conditions for research work. The work we have been doing so far is still limited in the field of the cognitive development. We are planning to

deepen our work in this field, and at the same time extend it to broader areas such as socialization, etc..

It is very difficult to compare things in different cultural environments. So it is very important for researchers to have basis knowledge of corresponding theories, to go deep into the realities of life and to get familiar with the environmental background for their studies, so that we can provide more scientific data for the basic theory of human development and practical demands.

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